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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/916,381	07/27/2001	Sadao Haga	71360-56296	7830
21874	7590	03/28/2006	EXAMINER	
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			UMEZ ERONINI, LYNETTE T	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 03/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/916,381	<b>Applicant(s)</b> HAGA ET AL.	
	<b>Examiner</b> Lynette T. Umez-Eronini	<b>Art Unit</b> 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 January 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7/27/01 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

Applicants' Remarks on pages 3-4 in Amendment filed 1/4/2006 were persuasive in showing Satoro et al. (JP 11194120) failed to disclosed applicants specifically claimed concentration of hexafluorosilicic acid being 10 to 40% by weight based on the weight of the etching solution. Hence, a modified Office Action is presented.

#### ***Declaration under 37 CFR 1.132***

1. The Declaration under 37 CFR 1.132 filed 6/13/2005 is insufficient to overcome the rejection of claims 1-7 based upon the 103(a) rejection over Lee et al. (US 6,284,712) in view of Uchida (US 5,307,296) as set forth in the last Office action because: the results shown in Tables 1 and 2 (on page 2-3 of the Declaration) failed to adequately compare applicants' solutions containing concentrations of hexafluorosilicic acid below 40% (as shown in Examples 1-13 of the present Specification) to an etchant comprising HF, HNO<sub>3</sub>, and H<sub>2</sub>SiF<sub>6</sub> wherein only one concentration of 42.7 % by weight H<sub>2</sub>SiF<sub>6</sub> that lies outside the range of 10% – 40% by weight H<sub>2</sub>SiF<sub>6</sub> was only used to generalize etching solutions containing concentrations of hexafluorosilicic acid greater than and outside the 40% are not optimally suited to etching silicon wafers. Applicants further failed to show what is expected if one uses for example, 45%, 50%, 60% . . . etc. by weight H<sub>2</sub>SiF<sub>6</sub>?

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Satoro et al. (JP 11194120).

Satoro teaches, “. . . a mixed acid solution in an etching process, nitric acid . . . one kind of hydrofluoric acid . . . and hexafluorosilicic acid are contained (Abstract) and etching a silicon wafer [0015 – 0018]. Satoro also teaches, “. . . the concentration of the nitric acid in the mixed-acid liquid . . . fluoric acid (same as applicants' hydrofluoric acid), an acetic acid, and hexa FURORO silicic acid (same as Applicants' hexafluorosilicic acid), was 34.5% of the weight, 75 % of the weight, 20.9 % of the weight, and 4.6 % of the weight, respectively, and the remainder was water [0048].

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The aforementioned reads on,

An etching solution containing at least hydrofluoric acid, nitric acid and hexafluorosilicic acid, **in claim 1**;

wherein the concentration of the hydrofluoric acid is 1 to 20% by weight based on the weight of the etching solution, **in claim 3**;

wherein the concentration of the nitric acid is 20 to 60% by weight based on the weight of the etching solution, **in claim 4**;

further comprising acetic acid, **in claim 5**; and

which is used for etching a silicon substrate, **in claim 7**.

It is noted that the reference of Satoro fails to disclose applicants' specifically claimed concentration of the hexafluorosilicic acid being 10% to 40% by weight based on the weight of the etching solution, **in claim 1**;

concentration of the hexafluorosilicic acid is 15 to 40% by weight based on the weight of the etching solution, **in claim 2**; and

concentration of the acetic acid is 0.01 to 5% by weight based on the weight of the etching solution, **in claim 6**.

However, the reference of Satoro is directed to a method wherein quantitative analysis is performed on a mixed acid solution to achieve etching control (see paragraph [0004]. As a result, the reference illustrates that the concentration of each acid is an optimized variable.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to select any concentration of hexafluorosilicic and acetic in the

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etching composition that would effectively accomplish a desired etch, including the specific concentration claimed by applicants, because the reference of Satoro illustrates that it is within the level of ordinary skill to perform a qualitative analysis on the etch components to optimize an etching process.

### ***Response to Arguments***

5. Applicant's arguments filed 1/4/2006 have been fully considered but they are not persuasive. Applicants traverse the 103(a) rejection of claims 1-7 as being unpatentable over of Lee (US 6,284,712) in view of Uchida (US 5,307,296). Applicants argue support to overcome the said rejection was provided in Declaration under 37 CFR 1.132 filed 6/13/2005, which showed concentrations  $\text{H}_2\text{SiF}_6$  below 40% by weight (in Examples 1-13 and particularly in Examples 8-10, of the Specification) were better suited than **only one** solution having greater than 40% by weight  $\text{H}_2\text{SiF}_6$  as shown by **only one** example, wherein the concentration 42.7 % by wt  $\text{H}_2\text{SiF}_6$  lies outside the range of 10-40% by weight  $\text{H}_2\text{SiF}_6$ .

Applicants' proposed unexpected results in the Specification and Declaration filed 6/13/2005 are insufficient to distinguish over the applied art because the units of etching stability are based on subjective criteria (i.e. gloss stability: very good, bad, poor) without standard units for comparison.

6. Applicant's arguments, see Remarks on pages 3-4, filed 1/4/2006, with respect to claims 1-7 have been fully considered and are persuasive. The rejection of claims 1-7 under 35 U. S. C. 102(b) has been withdrawn.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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ltue

March 11, 2006

  
SHAMIM AHMED  
PRIMARY EXAMINER